AID IN COMPLETING APPLICATION FOR RADIOACTIVE MATERIAL LICENSE - LABORATORY/INDUSTRIAL

For the most part the form is self-explanatory. Fill in the blanks, check the appropriate boxes, and attach the additional information as requested. Either use standard application appendices, where available, or submit equivalent procedures. These should be numbered according to the corresponding item number in the application.

Please submit the application and all attachments, with the exception of Regulatory Guide 10.7, which is for your information only.

Checking your work:

- ÿ Have you included the street address of the facility?
- ÿ Did you include the name and phone number of the contact person?
- ÿ Are you sure the sealed sources (if any) match the exposure devices according to manufacturer's data?
- ÿ Have you checked all the appropriate boxes, and filled in all required blanks?
- ÿ Have you completed and included all the requested attachments?

  Attachment A for RSO and each user - Training and Experience
  Attachment B or equivalent - Duties of the Radiation Safety Officer
  Attachment C or equivalent procedures - Calibration of Exposure Rate Instruments
  Pocket dosimeter check methods (unless approved service agency used)
  Detailed bioassay program
  Facilities and storage diagram
  Facilities and equipment description
  Attachment D or equivalent - Standard Survey Criteria and Procedures
  Detailed leak test counting procedures (unless approved service agency used)
  Attachment E - Records Required
  Sample of each record form
  Attachment F or equivalent instructions - Personnel Training Program
  Attachment G or equivalent lab safety rules - General Rules for Safe Use
  Attachment H or equivalent procedures - Waste Disposal
  Attachment I or equivalent procedures - Emergency Procedures
  Attachment J or equivalent procedures - Ordering and Accepting Delivery
  Attachment K or equivalent procedures - Opening Packages
  Attachment L - Air Emissions Questionnaire
  Detailed radiation safety procedures for working with lab animals (if applicable)
  Detailed radiation safety procedures for human use (if applicable)

- ÿ If this is a new application, have you enclosed the fee?

- ÿ Has the form been signed and dated by corporate management (not the RSO unless the management has filed with the Department a statement authorizing the RSO to sign all applications and radiation safety program commitments?)

Washington State Department of Health

Division of Radiation Protection

RHF-1LI
Application for Radioactive Material License Laboratory - Industrial

INSTRUCTIONS - Complete all items in this application for a new license or the renewal of an existing license. Use supplemental sheets where necessary. Item 29 must be completed on all applications. Mail in accordance with the directions contained in the application cover letter. Upon review and approval of this application, the applicant will receive a State of Washington Radioactive Material License issued in accordance with the general requirements contained in Washington State Department of Health, Rules and Regulations for Radiation Protection, and the Washington Nuclear Energy and Radiation Control Act, Chapter 70.98 RCW.

1. **Name and Mailing Address of Applicant** (institution,Firm,Individual owner, etc.) INCLUDE ZIP CODE	1A. **Street Address(es) at which Radioactive Material will be used** (if different than Item 1. INCLUDE ZIP CODE
2. **Person to Contact Regarding this Application**	**Telephone** (Area Code - Number - Extension)
3. **This is an Application for:** (Check appropriate item)	a. New License b. Renewal of License No _____
4. **Authorized Users** (Name of individuals who will use or directly supervise use of Radioactive Material.)	4A. **Training and Experience** (Check one or more) Attachment A completed and attached for RSO and each user or Training previously filed under License No._____
5. **Radiation Safety Officer (RSO)** (Name of person designated as Radiation Safety Officer.)	5A. **Duties of Radiation Safety Officer** (Check one) Attachment B completed and attached or Equivalent duties attached

6. **Radioactive Material** (Elements and Mass number of each.)	7. **Chemical and/or Physical Form or Sealed Source Manufacturer and Model Number**	8. **Maximum Activity of each Chemical or Source**	8A. **Maximum Yearly Throughput**
a. _____	a. _____	a. _____	a. _____
b. _____	b. _____	b. _____	b. _____
c. _____	c. _____	c. _____	c. _____

9. **Device and/or Use Description** (Make lettering correspond to lettering in Items 6, 7, 8 and 8A above.) Brief Description of Use - For Sealed Source, device in which source is used.
a.
b.
c.
10. Attach a complete description of handling procedures for each isotope including safety practices used, disposal practices, activity per order, activity per use and security measures.

11. **Radiation Detection Instruments** List radiation detection instruments possessed. (Pancake probe is required for β emitter, LSC for H-3, C-14, S-35, Low energy gamma scintillation probe for I-125 and an ion chamber for high energy gamma.)

MANUFACTURER	MODEL # & TYPE	PROBE MODEL	DETECTS	UNITS	TYPE OF USE

12. **Calibration of Detection Instruments** (mandatory for all instruments possessed)

A. Calibration Frequency

ÿ Annually and after each repair.

B. Calibrations (check one)

ÿ Applicant will do calibrations. Attach procedures. (Attachment C may be used for dose rate instruments)

ÿ Calibration will be done by an approved calibration service agency. List current or initial agency.

Name _____

Address _____

_____

_____

License Number _____

C. Daily Operational Checks

ÿ List source(s) used

13. **Personnel Monitoring** (check as appropriate)

ÿ No personnel monitoring: justification attached.

A. Type ÿ Whole Body ÿ Extremity

B. Radiation Detected

ÿ Beta-Gamma ÿ Beta-Gamma-Neutron

C. The following dosimeter requirements will be met:

ÿ Dosimeters stored in cool, dry place away from radiation sources when not in use.

ÿ Exchanged at least quarterly; Indicate initial or current frequency: ÿ Monthly ÿ Quarterly

ÿ A NVLAP certified dosimeter supplier will be used. Indicate initial or current supplier.
Name_____
Address _____

ÿ Check if using direct reading pocket dosimeters. Attach procedures for use, calibration, operational checks.

14. **Bioassay Program** (if applicable)

ÿ Bioassay program will be in accordance with WAC 246-221-100 (>10% of ALI in one year)

ÿ Attach description of program, including frequency.

ÿ In accordance with Reg. Guide 8.20 (I125 & I131)

Bioassays will be analyzed or done by:

ÿ Approved service company: List current or initial company.
Name _____
Address_____
_____

ÿ Applicant. Attach procedures, including calibration of analytical equipment.

15. **Facilities** (all four required)

ÿ Hoods used for radioactive material are checked annually to verify flow is 100 LFM under normal working conditions
Measurements are made by:_____

ÿ Facilities, equipment, and storage diagram attached.

ÿ Facilities and equipment description attached.

ÿ Ventilation diagram or description attached.

16. **Survey Program** (check one)

ÿ Attachment D signed and attached, or

ÿ Equivalent survey criteria and procedures attached.

17. **Leak Test Program** (if applicable) (check one)

ÿ Applicant will contract with approved outside consultant to do leak tests. List initial or current consultant.
Name _____
Address _____
_____

ÿ Applicant will do leak tests using approved leak test kit, mailing leak tests to kit manufacturer for counting.
Manufacturer Name _____
Address _____

ÿ Will do own leak test including counting. Detailed procedures attached.

18. **Records Management Program**

ÿ Sample of each record form attached.
Use Attachment E for list of required forms.

19. **Instructions to Personnel**

ÿ Attachment F completed and attached, or

ÿ Instructions to personnel attached

ÿ Attachment G Lab Safety Rules completed and attached

ÿ Equivalent safety rules attached.

20. **Waste Disposal**

ÿ Attachment H completed and attached, or

ÿ Equivalent procedures attached.

21. **Emergency Procedures**

ÿ Attachment I completed and attached, or

ÿ Equivalent procedures attached.

22. **Ordering and Receiving Packages**

ÿ Attachment J completed and attached, or

ÿ Equivalent procedures attached.

23. **Opening Packages**

ÿ Attachment K completed and attached, or

ÿ Equivalent procedures attached.

24. **Animal Use**

ÿ Not applicable

ÿ Detailed radiation safety procedures attached (including waste disposal).

25. **Human Use**

ÿ Not applicable

ÿ Detailed radiation safety procedures attached (including waste disposal).

26. **Air Emissions Questionnaire**

ÿ Attachment L completed and attached
(Based on the values submitted you may or may not have to submit additional information as specified in WAC 246-247-110 Appendix A.)

27. **Surety and Decommissioning**

ÿ Statement concerning Surety and Decommissioning as defined in WAC 246-235-075 attached.

28. **License Fee Required**

See WAC 246-254-057

A. License Fee Category _____

B. License fee enclosed: $ _____

Item 29 - Certificate

(This Item must be completed by Applicant)

The applicant and any official executing this certificate on behalf of the applicant named in Item 1, certify that this application is prepared in conformity with Washington State Department of Health, Radiation Control Regulations and that all information contained herein, including any supplements attached hereto is true and correct to the best of our knowledge and belief.

By: _____

_____ (TYPE OR PRINT NAME OF CERTIFYING OFFICIAL)

_____ (SIGNATURE)

_____ (TITLE OF CERTIFYING OFFICIAL)

_____ (DATE)

ATTACHMENT A

Training and Experience
Authorized User or Radiation Safety Officer

(Use supplemental sheets if necessary.)

1. **Name of Applicant**	2. **Date of Application**

3. Training received in basic radioisotope handling techniques

Type of Training	**Where Trained**	**Date(s) & Duration of Training**	**Formal Course**	**On the Job**
a. Principles and practices of radiation protection			ÿ Yes ÿ No	ÿ Yes ÿ No
b. Radioactivity measurement standardization and monitoring techniques and instruments			ÿ Yes ÿ No	ÿ Yes ÿ No
c. Mathematics and calculations basic to the use and measurement of radioactivity			ÿ Yes ÿ No	ÿ Yes ÿ No
d. Biological effects of radiation			ÿ Yes ÿ No	ÿ Yes ÿ No

4. Experience with Radioactive Materials. (Actual use of radioisotopes)

Isotope	**Maximum Amount Used per Experiment**	**Where Experience was Gained**	**Date(s) and Duration of Experience**

5. Resume' of radiation work experience

Dates of Employment	Employer Name/Address/ Supervisor/ Phone Number	Job Title/Type of Isotope use

ATTACHMENT B
Duties of the Radiation Safety Officer

1. Make sure that all uses of radiation are conducted safely, adhere to the conditions of the license and license application, and result in exposures to personnel which are as low as reasonably achievable (ALARA).

2. Act as liaison agent with regulatory authorities, be available for assistance in inspection and audits, and notify the department:

   A. In writing before making any change which would render the Application for Radioactive Materials License, Radioactive Materials License, Application for Registration (of radiation producing machines, or Notice of Registration no longer accurate.

   B. Immediately in the event of any radiation accident or incident (including high dosimeter reading):

   C. Within five (5) days of any positive leak test result of a sealed source; and/or

   D. Within thirty (30) days in a report stating remedial action taken after accident or incident.

3. Be familiar with all applicable regulations and regulatory guides, and assure that license applications are properly filled out and are submitted on time.

4. Make sure all surveys, calibrations, and leak tests are performed on time.

5. Establish and maintain record systems as applicable for radiation area surveys, wipe tests, leak tests, calibration of instruments, and personnel dosimeter reports.

6. If dosimetry is required, advise individual radiation workers of each high exposure report, and conduct a survey to determine the cause of all overexposures so as to preclude reoccurrence. Perform a quarterly review of occupational exposure to authorized users and workers to determine that the exposures are within the limits established for the ALARA program. Annually advise each radiation employee of annual accrued dose including internal and external exposures.

7. Assure that individuals working with radiation have appropriate protective devices, including shielding, ventilation, clothing, gloves, remote handling equipment (where necessary), and facilities which aid in keeping exposures As Low As Reasonably Achievable (ALARA).

8. Procure and maintain an adequate number of operable and properly calibrated radiation survey instruments, of the appropriate range and type, and properly calibrated counting equipment (if applicant will assay contamination and leak tests).

9. Develop and maintain up-to-date operating and emergency procedures.

10. Perform, or cause to be performed, semi-annual inventory of all sealed sources received or possessed.

11. Post conspicuously "Notice to Employees" RHF-3 and notices of items of noncompliance resulting from department inspections.

12. Supply employers of terminated radiation personnel with radiation exposure records as required by regulation.

13. Establish and cause to be maintained inventory control of radioisotopes, making sure inventory never exceeds amounts licensed.

14. Keep, or cause to be kept, records of receipts of incoming isotopes and surveys of incoming and outgoing shipments.

Attachment B - continued

15. Make sure that all incoming and outgoing radioactive shipments are properly packaged and labeled according to DOT requirements, and that shipments are accompanied by proper shipping papers.

16. Assure that radioactive materials are disposed of properly, and that records are maintained of all radioactive wastes disposed.

17. Perform an annual review of radiation safety program for adherence to ALARA concepts. Make sure that the safety program is followed by all workers dealing with radioactive materials. Investigate any deviation from the program, and take any remedial action necessary.

18. Schedule briefings and educational sessions to inform workers of radiation safety rules and procedures:

    A. For all new personnel,

    B. With each change in license condition or safety program, and

    C. Annually in a refresher course for all personnel.

    This includes instruction in the ALARA program and philosophy.

19. Apprise and inform management of radiation safety status and their responsibilities in maintaining an adequate radiation safety program.

20. Take charge in all emergency situations (spills, or release of radioactive material, etc.) to make sure correct emergency decontamination and protection procedures are carried out. Also evaluate the situation that led to the emergency, to reduce the chance of further problems.

21. Assure that radioactive materials are used only by individuals authorized by the license.

22. Assure that radioactive materials are properly secured against unauthorized removal.

The RSO should have some formal training in radiological health (i.e. college level or its equivalent) and should have specific experience in radiation protection with types, quantities, and use of the radioactive material to be used under the license.

Approved by _____ Date _____

ATTACHMENT C
CALIBRATION OF EXPOSURE RATE INSTRUMENTS
(Use only if calibrating Dose Rate Instruments yourself.)

1. Calibration of survey meters shall be performed with radionuclide sources.

   A. The Sources shall approximate point sources.
   B. The source activities or exposure rates at given distances shall be traceable by documented measurements to a standard source certified within five percent accuracy by the U.S. National Bureau of Standards (NBS) calibrations.
   C. The frequency shall be at least every 12 months and after servicing, except that instruments used for surveys related to industrial radiography shall be calibrated at intervals not to exceed three months and after each servicing and repair.
   D. Each scale of the instrument shall be calibrated at least at two points located at approximately 1/3 and 2/3 of full scale.
   E. The exposure rate (mR/hr) measured by the instrument shall differ from the true exposure rate by less than 10 percent at the two points on each scale (read appropriate section of the instrument manual to determine how to make necessary adjustments to bring instrument into calibration.) Readings within $\pm$ 20 percent will be considered acceptable if a calibration chart, graph, or response factor is prepared, attached to the instrument, and used to interpret meter readings to within 10 percent for radiation protection purposes.
   F. Records of required calibrations shall be maintained for inspection for a period of at least two years from the date of calibration.

NOTE: Sources of Cs-137, Ra-226, or Co-60* are appropriate for use in calibrations. Since these sources emit rather high-energy photons, they are not suitable for low-energy calibrations that may be required under special circumstances (see Item 3). The activity of the calibration standard should be sufficient to calibrate the survey meters on each scale to be used for radiation protection purposes. Scales up to 1R/hr should be calibrated, but higher-range scales above 1R/hr need not be calibrated when they will not be needed for radiation protection surveys. If there are higher ranges, they should at least be checked for operation and approximately correct response to radiation. Otherwise, a cautionary note that they have not been checked should be placed on the instrument.

These procedures and standards are not appropriate for instruments used to detect or quantify measurements in the I-125 energy range.

2. A reference check source of long half-life, e.g., Cs-137 or Ra-226, shall also be read at the time of the above calibration or as soon as the instrument is received from the calibration laboratory. The readings shall be taken with the check source placed in specific geometry relative to the detector. A reading of this reference check source shall be taken:

   A. Before each use and also after each survey to ensure that the instrument was operational during the survey;
   B. After each maintenance and/or battery change; and
   C. At least every three months.

   If any reading using the same geometry is not within $\pm$ 20 percent of the reading measured immediately after calibration, the instrument must be re-calibrated (see Item 1.)

* Minimum activities of typical sources are 85 mCi of CS-137, 21 mCi of Co-60, and 34 mCi of Ra-226 (to give at least 700 mR/hr at 20 cm).

Attachment C - continued

3. Calibration source energies must correspond to energies of radioactive materials to be detected if instrument response is energy dependent, and if the instrument is to be used for quantitative measurements in the Xe-133 or Tc-99m energy ranges.

   The calibration may be done either:

   A. As in Item 1 above, with NBS-traceable calibration standards of radionuclides at or near the desired energies, or
   B. As a relative inter-comparison with an energy-independent instrument and un-assumed or uncertified radionuclides.

   Alternatively, the manufacturer's energy response curve(s) may be used to correct instrument readings appropriately when lower-energy radiation is monitored.

4. Records of the above Items 1; 2-B and -C; and 3 must be maintained.

5. Use of Inverse Square Law and Radioactive Decay Law

   A. An approved calibration source will have a calibration certificate giving its exposure rate at a given distance, or its activity, measured on a specified date by the manufacturer or NBS.

      (1.) The Inverse Square Law may be used with any point source* to calculate the exposure rate at other distances.
      (2.) The Radioactive Decay Law may be used to calculate the exposure rates or source activities at times other than the calibration date.

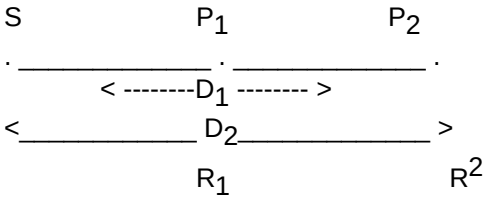
   B. Inverse Square Law

   Consider a point source of radiation at position S, as shown in Figure C-1. Then, the relationship between exposure rates R_1, and R_2 at detector positions P_1 and P_2, which are the distances D_1 and D_2 from S, respectively, is given by the following equation:

$$R_2 = \frac{D_1^{\,2}}{D_2^{\,2}} \; x \; R_1$$

   Where R_1 and R_2 are exposure rates in the same units (e.g., mR/hr, R/hr) and D_1 and D_2 are the distances in Figure C-1 in the same units (e.g., m, cm, ft)

Figure C-1 →



* A source may be considered a point source when the source and the radiation detector are small, in any dimension, compared to the distances at which radiation is to be measured. The center of the detector should be at distances D_1 or D_2 as shown in Figure C-1.

Attachment C - continued

C. Radioactive Decay Law

$$R_t = R_o e^{-\left(\frac{0.693\,t}{T_{1/2}}\right)}$$

Where

R_o and R_t	are in the same units (e.g., mR/hr or R/hr)
R_o	is exposure rate on the specified calibration date
R_t	is exposure rate at some time later designated, t
$T_{1/2}$ and t	are in the same units (years, months, days, etc.)
$T_{1/2}$	is radionuclide half-life
t	is the time elapsed between calibration and present time

Example: Source output is given by calibration certificates as 100 mR/hr at one (1) foot on March 10, 1975. Radionuclide half-life is 5.27 years.

Question: What is the output at three (3) feet on March 10, 1977 (2.0 years later)?

(1). Output at 1 foot, 2.0 years after calibration date:

$$R = 100 \text{ mR/hr} \times e^{-\left(\frac{0.693 x\ 2.0}{5.27}\right)}$$

= 100 x 0.77 = 77 mR/hr at 1 foot on March 10, 1977.

(2). Out put at three (3) feet, 2.0 years after calibration date:

$$R = \frac{(1\,ft)^2}{(3\,ft)^2} \times 77 \text{ mR/hr}$$

$$= \frac{1}{9} \times 77 = 8.6 \text{ mR/hr}$$ at 3 feet, 2.0 years after calibration.

Approved by: _____ Date _____

Attachment C - continued
Sample Form

Certificate of Instrument Calibration

Licensee Name: _____

Instrument: **Probe:** (if detachable)

Manufacturer _____ Manufacturer _____

Type _____ Type _____

Model No. _____ Model No. _____

Serial No. _____ Serial No. _____

Calibration Data:

Scale	Actual Exposure Rate (mR/hr)	Initial Instrument Reading (mR/hr)	% Error	Adjusted Instrument Reading (mR/hr)	Final % Error

Replace Batteries? ÿ Yes ÿ No

Comments:

Calibration Source:

Manufacturer/Model No. _____ Serial No. _____

Nuclide _____ Accuracy _____ Original Activity/Date _____ / _____

Decay Factor _____ Current Activity _____

Exposure Rate at Specified Distance _____

Calibrated by: _____ Date _____

ATTACHMENT D
Standard Survey Program for Unsealed Radioactive Material

1. A reference check source of long half-life, e.g., Cs-137 or Ra-226, shall be read and recorded at the time of the initial receipt of the instrument or as soon as the instrument is received from calibration. The readings shall be taken with the check source placed in specific geometry relative to the detector. A reading of this reference check source shall be taken before and after each survey, and after each maintenance and/or battery change. If any reading using the same geometry is not within ± 20 percent of the reading measured immediately after calibration, the instrument must be re-calibrated.

2. Use areas shall be surveyed on a weekly basis unless they meet one of the criteria below. Any room meeting this criteria may be surveyed monthly.

   A. A room, such as a counting, equipment, or autoradiograph room, where all material is contained and unopened.

   B. Activity used per month is no more than the values listed in Table I.

   C. Long term waste storage areas which are accessed infrequently (once a month or less).

3. Daily or after use, surveys will be done of clothing, hands and work areas when working with high energy beta, gamma emitters, or I-125, using an appropriate low range instrument. After-use surveys will be done if a spill is suspected.

4. Special surveys will be done of work areas immediately after working with quantities greater than or equal to fifty (50) times the values in Table I.

5. The weekly, monthly, and special surveys will consist of :

   A. A direct measurement of radiation levels with a survey meter sufficiently sensitive to detect 0.05 mR/hr or 10,000 cpm. This measurement is not needed for low energy beta emitters.

   B. A series of wipe tests to measure contamination level. The method for performing wipe tests will be sufficiently sensitive to detect 100 dpm per 100 cm^2 for the radionuclide involved. If you are using a portable instrument to measure the wipes, go to a low background area to count the wipes.

6. A permanent record will be kept of all survey results, including negative results. The record will include:

   A. Location, date, and person doing the survey.

   B. Identification of equipment used, including serial number and pertinent counting efficiencies.

   C. Drawing of the area surveyed, identifying relevant features such as storage areas, waste areas and major use areas. Also include numbered locations corresponding to the places surveyed.

   D. Measured exposure or count rates, keyed to locations on the drawing.

   E. Results of contamination survey, keyed to locations on the drawing.

   F. A background reading for the portable instrument and the results of a blank wipe for non-portable counters.

   G. Corrective action taken when survey results exceed action levels.

ATTACHMENT D
Standard Survey Program for Unsealed Radioactive Material
continued

7. Action level for direct survey and contamination surveys will be three times the background reading in an area with no radioactive material present or three times the reading on a blank wipe.

Table I

Radionuclide	Monthly Throughput (megabecquerels)	(microcuries)
Hydrogen 3	296	8000
Carbon 14	7.4	200
Phosphorus 32	2.22	60
Phosphorus 33	22.2	600
Sulfur 35	37	1000
Calcium 45	7.4	200
Chromium 51	37	1000
Cobalt 60	1.85	50
Iodine 125	0.15	4
Iodine 131	0.11	3
Thorium 228	0.02	0.6
Uranium 238	0.037	1
Plutonium 239	0.003	0.08
Plutonium 241	0.15	4

For radionuclides not listed, take 1/10 of the lowest of the Annual Limits on Intake listed in WAC 246-221-290 Table I Columns 1 and 2.

Approved by:_____ Date _____

ATTACHMENT E
Records Required for Laboratory - Industrial License

Laboratory and industrial radioactive material licensees are required to maintain a number of records. This form is designed to simplify your task of complying with the regulations in regard to record keeping. The different record requirements are listed below in the order they appear in WAC 246. It is your responsibility to develop your own records and make sure that all required records are accounted for.

Because the RHF-1LI Application Form is used for a wide variety of laboratory and industrial applications, ranging from small laboratories to large scale industrial uses of radioactive materials, this attachment may list a number of records which may not apply to all users. If a record described in the attachment is for some material or equipment that you will not have, write N/A in the space to the right of the records description. If the need for a particular record would arise only rarely, you need not compose a special form for that record, but may document the required information by letter or memo.

Provide a copy of all records used.

Section of WAC	Type of Records	Form Code No.
246-220-020 (1)	General provisions require records of receipt, use, storage, transfer, and/or disposal of radiation sources.	_____
246-249-030 (1)	Waste shipment certification to accompany each shipment of radioactive waste to the low-level radioactive waste burial site (may use departmental form RHF-31).	_____
246-233-020 (4) (c) (iv)	For licensees with generally licensed gauges, maintain records of tests for leakage of radio-active material and proper operation of the on-off mechanism or indicator in compliance with WAC 246-233-020 (4) (c) (ii) and (iii).	_____
246-221-020 (4)	Records of employee's prior dose history (may use departmental form RHF-4A).	_____
246-221-080 (2)	Record of leak tests.	_____
246-221-090 (2) (d)	Record of exposure circumstances of personnel monitoring device when it was not worn.	_____
246-221-110	Records of surveys preserved as specified in WAC 246-221-230 (this includes receipt surveys, contamination surveys, etc.)	_____
246-221-190	Records of disposal by release into sanitary sewerage systems proving compliance with limits in WAC 246-221-190.	_____
246-221-230 (7)	Records of radiation exposures on RHF-5A or all other forms containing all the information required by form RHF-5A.	(this information is usually contained in vendor's film badge exposure reports)
246-222-030	Records of instructions to workers.	_____

ATTACHMENT F
Personnel Training Program

1. The Radiation Safety Officer or title_____ shall provide instruction to radiation workers. Instruction shall include, but is not limited to:

   A. General radioactive materials safety rules:

   B. Personnel monitoring program (e.g., use, exchange, storage, records, and reports):

   C. Radiation and contamination survey program:

   D. Accident, incident, and emergency procedures:

   E. Radioactive materials work procedures:

      (1) ordering, receipt and opening procedures:
      (2) storage:
      (3) use of radioactive materials:
      (4) waste packaging and storage:
      (5) transportation procedures.

   F. Applicable state and federal rules and regulations and license conditions.

2. The Radiation Safety Officer or (title) _____ shall provide instruction to ancillary personnel, such as clerical, janitorial, and security personnel, whose duties may require them to work in the vicinity of radioactive material, but not be limited to:

   A. All terms of the license pertinent to radiation safety.

   B. Identification of areas where radioactive material us used or stored.

   C. Potential hazards associated with radioactive material.

   D. Radiological safety procedures appropriate to their respective duties.

   E. Pertinent state and federal regulations.

   F. Rules and procedures of the license.

   G. Obligation to report unsafe conditions to the Radiation Safety Officer.

   H. Appropriate response to emergencies or unsafe conditions.

   I. Right to be informed of their radiation exposure and bioassay results.

   J. Locations where the licensee has posted or made available notices, copies of pertinent regulations, and copies of pertinent licenses and license conditions (including applications and applicable correspondence,) as required by WAC 246-222.

The Radiation Safety Officer shall verify that personnel will be properly instructed before assuming duties with, or in the vicinity of, radioactive materials, during annual refresher training, and whenever there is a significant change in duties, regulations, or the terms of the license.

_____ _____

APPROVED BY DATE

ATTACHMENT G
General Rules for Safe Use of Radioactive Material

Check appropriate boxes which you will institute, and which apply to your facility.

ÿ 1. Wear laboratory coats or other protective clothing at all times in areas where dispersible radioactive materials are used.

ÿ 2. Wear disposable gloves at all times while handling dispersible radioactive materials.

ÿ 3. Monitor hands and clothing for contamination after each procedure or before leaving the area.

ÿ 4. Use shielding devices and/or remote tools when working with millicurie or greater quantities of radioactive materials.

ÿ 5. A. Do not eat, drink, smoke, or apply cosmetics in any area where radioactive material is stored or used.

B. Do not store food, drink, or personal effects with radioactive material (e.g., in refrigerator).

ÿ 6. Wear personnel monitoring devices (film badge or TLD) at all times while in areas where radioactive materials are used or stored. These devices should be worn at chest or waist level. Personnel monitoring devices when not being worn to monitor occupational exposures should be stored in a designated low background area.

ÿ 7. Wear TLD finger badges when manipulating millicurie or greater quantities of radioactive materials.

ÿ 8. Dispose of radioactive waste only in specially designated drains or properly shielded receptacles.

ÿ 9. Never pipette by mouth.

ÿ 10. Survey laboratory work area for contamination after each procedure, or at the end of the day. Decontaminate if necessary.

ÿ 11. Confine radioactive solutions in covered containers plainly identified and labeled with name of compound, radionuclide, date, activity, and radiation level, if applicable.

ÿ 12. Always transport radioactive material in shielded containers.

ÿ 13. Use remote tools when handling sealed sources.

ÿ 14. Leak test nuclear gauges with gauges in the locked, stored, or safe position, but ONLY if the license authorizes you to take the leak tests.

_____ _____

APPROVED BY DATE

ATTACHMENT H
Waste Disposal

1. Liquid waste (other than liquid scintillation cocktail) will be disposed of (check as appropriate)

   - ÿ In the sanitary sewer system in accordance with WAC 246-221-190, complete Item 5 below.
   - ÿ Solidified and disposed by commercial waste disposal service, complete Item 4 below.
   - ÿ Other (specify) _____
   - ÿ Held for decay for at least ten (10) half lives, until radiation levels, as measured in a low background area with a low-level survey meter and with all shielding removed, have reached background levels. All radiation labels will be removed or obliterated, and the waste will be disposed of in normal trash.

2. Liquid Scintillation Cocktail will be disposed of:

   - ÿ In sanitary sewerage system in accordance with WAC 246-221-190. Must be designated as biodegradable by Washington State Regulations which are more restrictive than the Environmental Protection Agency.
   - ÿ By commercial waste disposal service _____
     NAME

3. Other solid waste will be disposed of (check as appropriate)

   - ÿ By Return to the manufacturer.
   - ÿ Held for decay for at least ten (10) half lives, until radiation levels, as measured in a low background area with a low-level survey meter and with all shielding removed, have reached background levels. All radiation labels will be removed or obliterated, and the waste will be disposed of in normal trash.
   - ÿ By in-house compaction, describe under Item 15 of foregoing application.
   - ÿ By commercial waste disposal service, complete Item 4 below. *
   - ÿ Other (specify) _____

4. The commercial waste disposal service used will be _____
   NAME

   _____
   ADDRESS CITY STATE

   Radioactive Materials License Number _____

5. Sanitary sewer radioactive material disposal concentration calculation.

   A. Determine total volume of sewage per month _____ ml

   (Note: The total volume of sewage may be estimated by averaging the volume as stated on the sewage bill or the volume of water used by a facility as stated on a water bill.)

   Useful Conversions: 1 cubic foot = 2.832×10^4 ml 1 gallon = 3.78×10^3 ml

Attachment H - continued

B. Determine average activity for each isotope disposed of via the sanitary sewer per month.

	Isotope	Activity (microcuries per month)
1)	_____	_____
2)	_____	_____
3)	_____	_____
4)	_____	_____
5)	_____	_____

C. For each isotope, divide the activity (microcuries) by the monthly volume (ml).

	Isotope	Activity ÷ Monthly Volume = Monthly Concentration
1)	_____	_____µCi ÷ _____ ml = _____ µCi/ml
2)	_____	_____µCi ÷ _____ ml = _____ µCi/ml
3)	_____	_____µCi ÷ _____ ml = _____ µCi/ml
4)	_____	_____µCi ÷ _____ ml = _____ µCi/ml
5)	_____	_____µCi ÷ _____ ml = _____ µCi/ml

D. Refer to WAC 246-221-190 and WAC 246-221-290, Appendix A, Table 3 to determine compliance with regulations.

_____ _____

APPROVED BY DATE

ATTACHMENT I
Emergency Procedures

Minor Spills

1. NOTIFY - Notify persons in the area that a spill has occurred.

2. PREVENT THE SPREAD - Cover the spill with absorbent paper.

3. CLEAN UP - Use disposable gloves and remote handling tongs. Carefully fold the absorbent paper and pad. Insert into a plastic bag and dispose in the radioactive waste container. Also insert into the plastic bag all other contaminated materials such as disposable gloves.

4. SURVEY - with a low-range, thin-window G-M survey meter, checking the area around the spill, hands, and clothing for contamination.

5. REPORT - Report incident to the Radiation Safety Officer.

Major Spills

1. CLEAR THE AREA - Notify all persons not involved in the spill to vacate the room.

2. PREVENT THE SPREAD - Cover the spill with absorbent pads, but do not attempt to clean it up. Confine the movement of all potentially contaminated personnel to prevent any spreading.

3. SHIELD THE SOURCE - If possible, the spill should be shielded, but only if it can be done without further contamination or without significantly increasing your radiation exposure.

4. SECURE THE ROOM - Leave the room and lock the door(s) to prevent entry.

5. CALL FOR HELP - Notify the Radiation Safety Officer immediately.

6. PERSONNEL DECONTAMINATION - Contaminated clothing should be removed and stored for further evaluation by the Radiation Safety Officer. If the spill is on the skin, flush thoroughly and then wash with mild soap and lukewarm water.

Radiation Safety Officer _____

Office Phone _____

Home Phone _____

Loss, Theft, Fire, Explosion, or Vehicle Accident

Follow the procedures outlined in the Washington State Department of Health - Radiation Emergency Handbook. Principally this shall include:

1. Secure the area around the accident. Keep unauthorized persons away. Alert people in the vicinity as to the presence of radioactivity and a possible hazard.

Attachment I - continued

2. DO NOT leave the site. Send a helper or onlooker to notify the following:

   a. Radiation Safety Officer _____

      Work Phone _____ Home Phone _____

   b. Local Police _____

   c. Local Fire Department, where applicable _____

3. The Radiation Safety Officer, in turn, must immediately notify the State of Washington Radiation Emergency Response at (206) 682 - 5327, which is

   206 N-U-C-L-E-A-R

   and other local authorities, as indicated.

4. The radiation worker should inform emergency workers of the radiation hazard possibly existing, should help them keep the area secure, and should explain to the emergency personnel the location of the radioactive device or chemical and the extent of the possible hazard. In no case should the radiation worker leave the site until qualified experts arrive, unless, of course, said worker is seriously injured or incapacitated, and must be removed from the site by emergency personnel.

Alternate Names and Telephone Numbers Designated by Radiation Safety Officer

_____	_____
_____	_____
_____	_____
_____	_____

_____ _____

APPROVED BY DATE

ATTACHMENT J
Procedures for Ordering and Accepting Delivery of Radioactive Material

1. The Radiation Safety Officer, or his/her designee, will place all orders for radioactive materials and will ensure that the requested materials and quantities are authorized by the license and that possession limits are not exceeded.

2. A system for ordering and receiving radioactive materials will be established and maintained. The system will consist minimally of the following:

   A. Ordering of routinely used materials -

      (1.) Written records that identify the isotope, compound, activity levels, and supplier, etc., will be used.

      (2.) The written records will be referenced when opening and/or storing radioactive shipments.

   B. Ordering of specially used materials -

      (1.) A written request will be obtained from the authorized user who will perform the procedure.

      (2.) Persons ordering the materials will reference the authorized user's written request when placing the order. The authorized user's request will indicate isotope, compound, activity level, etc.

      (3.) The authorized user's written request will be referenced when receiving, opening, and/or storing the radioactive material.

   C. Maintain written records for all ordering and receipt procedures.

3. During normal working hours, carriers will be instructed to deliver all radioactive package(s) directly to the nuclear laboratory or to some other official receiving area for radioactive materials.

4. During off-duty hours, security personnel or other designated individuals will accept delivery of radioactive package(s) in accordance with the procedures as stated in your facility memorandum as attached.

_____ _____

APPROVED BY DATE

Attachment J - continued
EXAMPLE

To: Security Personnel _____

From: Administrator _____

Subject: Receipt of Package(s) Containing Radioactive Material

Any package(s) containing radioactive material that arrive between 4:30 p.m. and 7:00 a.m., or on Sundays shall be signed for by the security guard on duty, and be taken immediately to the nuclear laboratory. Unlock the door, place the package on top of the counter immediately to the right of the door, re-lock the door.

If the package is wet or appears to be damaged, IMMEDIATELY contact the company Radiation Safety Officer. Ask the carrier to remain until it can be determined that neither the driver nor the delivery vehicle is contaminated.

Radiation Safety Officer _____

Office Phone _____

Home Phone _____

Submit a copy of your own company's memorandum

_____ _____

APPROVED BY DATE

ATTACHMENT K
Procedures for Safely Opening Packages Containing Radioactive Material

1. Special requirements will be followed for packages containing quantities of radioactive material in excess of the Type A, quantity limits (these are packages containing "X" amounts.) They will be monitored for surface contamination and external radiation levels within three (3) hours after receipt if received during working hours or within eighteen (18) hours if received after working hours, in accordance with the requirements of WAC 246-221-160. All shipments of liquids greater than exempt quantities will be tested for leakage. The Department will be notified in accordance with the regulations if removable contamination exceeds 0.01 μCi/100 cm or if external radiation levels exceed 200 mR/hr at the package surface or 10 mR/hr at three (3) feet (or 1m.)

2. For all packages, the following additional procedures for opening packages will be carried out:

   A. Put on gloves to prevent hand contamination.

   B. Visually inspect package for any sign of damage (e.g., wetness, crushed, etc.) If damage is noted, stop procedure and notify Radiation Safety Officer.

   C. Measure contamination on external surface of any package labeled with a radioactive white I, yellow II, or yellow III label, unless material is in gas form, or a special form as delineated on the packaging slip.

   D. Measure surface count or rate and record. If reading is greater than _____mR/hr, or _____ CPM (insert appropriate action levels for your facility,) stop procedure and notify Radiation Safety Officer.

   E. Open the package with the following precautionary steps:

      (1.) Open the outer package (following manufacturer's directions, if supplied,) and remove packing slip.
      (2.) Open the inner package and verify that contents agree with those on packing slip. Compare the requisition, packing slip, and label on container.
      (3.) Check integrity of final source container (i.e., inspect for breakage of seals or vials, loss of liquid, and discoloration of packaging material.)
      (4.) Check also that receipt of this shipment does not exceed possession limits.

   F. Monitor the packing material and package(s) for contamination before discarding.

      (1.) If contaminated, treat as radioactive waste.
      (2.) If not contaminated, obliterate radiation labels before discarding in regular trash.

3. Maintain records of the results of checking each package, using "Radioactive Shipment Receipt Record" (see next page), or a form containing the same information.

_____ _____

APPROVED BY DATE

Type A Package Quantity Limits for Selected Radionuclides

Radionuclide	**(Unsealed Material)**	Ci
H-3		1000
Carbon 14		60
Sulfur 35		10
Phosphorus 32		60
Cesium 137		30
Iodine 125		70
235	Uranium (92)	0.2
226	Radium (88)	0.05

Attachment K - continued
EXAMPLE
Radioactive Shipment Receipt Report

1. PO No. _____ Survey Date _____

   Time _____ Surveyor _____

2. Condition of Package: ÿ OK ÿ Punctured ÿ Wet ÿ Crushed

   ÿ Other _____

3. Radiation Units on Label _____

4. Measured Radiation Levels

   Instrument Used _____

   Background _____

   Response Check _____

   Package Surface _____ mR/hr or CPM

5. Do Packing Slip and Vial Contents Agree?

   A. Radionuclide ÿ Yes ÿ No, difference _____

   B. Amount ÿ Yes ÿ No, difference _____

   C. Chem. Form ÿ Yes ÿ No, difference _____

6. Wipe Results From:

   Outer _____ CPM = _____ DPM

   eff = ( )

7. Survey Results of Packing Material and Cartons _____ CPM
   If H-3 or C-14, a wipe of inner packaging will suffice.

8. Disposition of Package After Inspection _____

9. If Department and/or Carrier Notification Required, Give Time, Date, and Persons notified.

10. If Radiation Safety Officer notification is required, he/she must sign below.

ATTACHMENT L
Air Emissions Questionnaire for Exempt Status

(Complete table below for Items 1, 2, and 3.)

1. List all radionuclides to be authorized on your license. Use additional sheets as necessary.
2. Estimate the Annual Possession Quantity, the sum of the quantity of a radionuclide possessed at the beginning of the calendar year plus the quantity of radionuclide received or produced during the calendar year. Perform this calculation for each radionuclide listed in Item 1.
3. For each radionuclide list all physical forms that may be exhibited during possession. If a radionuclide will exist in more than one form, give separate listings for each. List the most restrictive physical form (gas, liquid, then solid, capsules are considered solid) that any quantity of radionuclide will exhibit. For instance, if you will use 2 curies of tritiated water to produced H-3 gas and 1 curie of tritiated water that will remain in the aqueous phase your response should be:

H-3	1 Ci per year	liquid
H-3	2 Ci per year	gas

1. Radionuclide	**2. Annual Possession Quantity** (curies/year)	**3. Physical Form** (gas, liquid, or solid)
A.	**A.**	**A.**
B.	**B.**	**B.**
C.	**C.**	**C.**
D.	**D.**	**D.**
E.	**E.**	**E.**

4. Release Height (the distance from ground level to the top of the stack or release point) _____ meters

5. Building Height _____ meters

6. Building Width _____ meters

7. Distance to Nearest Residence/Business (Maximally Exposed Individual) _____ meters

8. Is the maximally exposed individual in the same building? ❑ Yes ❑ No

If Question 8 is "Yes" complete Questions 9 and 10.

9. Stack Diameter _____ meters

10. Stack Volumetric Flow Rate _____ m^3/s

Distance from the maximally exposed individual to:
(If vegetables, milk or meat for individual consumption are produced at the location of the maximally exposed individual, the distance in Question 7 should be recorded.)

11. Nearest individual/farm producing vegetables _____ meters

12. Nearest individual/farm producing milk _____ meters

13. Nearest individual/farm producing meat _____ meters

Facility name: _____ **Facility Address:** _____
_____

Signature/ Title: _____ **Date:** _____

TO: New and Renewal License Applicants

SUBJECT: CITY/COUNTY OFFICIAL NOTIFICATIONS

The Department of Health has adopted a local Government Notification Policy as required by law. The Division of Radiation Protection notifies the appropriate local government officials whenever a Radioactive Materials License application is received. In order to allow local officials time to comment if they wish, the Division of Radiation Protection is required to delay the issuance of licenses for at least 20 days from the date of such notification. In order to expedite this notification process, please supply the information requested below.

NOTE: If you have more than one facility, your answers must pertain to the facility/facilities where radioactive material is to be used and/or stored.

RETURN THIS DOCUMENT WITH YOUR RADIOACTIVE MATERIALS LICENSE APPLICATION.

Name of License Applicant:_____

***IF YOUR FACILITY IS LOCATED INSIDE THE CITY LIMITS, PLEASE INDICATE**:

Name of City:_____

Name of Mayor:_____

Complete Mailing Address of Mayor (*Street, P.O. Box, City, State, Zip Code*):

_____

_____

***IF YOUR FACILITY IS LOCATED OUTSIDE THE CITY LIMITS, PLEASE INDICATE:**

Name of County:_____

Name of County Commissioner:_____

Complete Mailing Address of Commissioner (*Street, P.O. Box, City, State, Zip Code*):

_____

_____

*****IS YOUR FACILITY LOCATED ON FEDERAL OR INDIAN LAND? YES____ NO____***